

WHAT IS CLAIMED IS:

1. A refrigeration system module for heating or cooling an object, said module comprising:

an enclosure having a refrigeration system disposed therein, said refrigeration system including a vapor compression circuit for circulating a refrigerant and having a compressor, a first heat exchanger, an expansion device and a second heat exchanger operably disposed therein in serial order;

said first heat exchanger defining a first outward facing surface of said enclosure, said first surface being a thermal exchange surface wherein said first heat exchanger provides thermal communication between said first surface and refrigerant flowing within said first heat exchanger; said second heat exchanger defining a second outward facing surface of said enclosure; said second surface being a thermal exchange surface wherein said second heat exchanger provides thermal communication between said second surface and refrigerant flowing within said second heat exchanger, said first and second surfaces being disposed on opposite sides of said enclosure; and

at least one attachment feature disposed on said module wherein said at least one attachment feature is attachable to the object to thereby secure the object in thermal communication with at least one of said first and second surfaces.

2. The refrigeration system module of claim 1 wherein said at least one attachment feature comprises at least one aperture disposed proximate each of the first and second surfaces wherein a fastener is insertable through each of the apertures.

3. The refrigeration system module of claim 1 wherein said first and second surfaces have substantially similar surface areas.

4. In combination with the module of claim 3, wherein said module is a first module, a second module wherein said at least one attachment features of said first and second modules are secured together and said first surface of one of said first and second modules is in thermal communication with said second surface of the other of said first and second modules.

5. The combination of claim 4 wherein said attachment features comprise a plurality of apertures disposed adjacent each of said first and second surfaces of each of said first and second modules.

6. The refrigeration system module of claim 1 wherein said compressor is a hermetically sealed compressor mounted within said enclosure and said enclosure provides communication between an interior of the enclosure and the ambient environment.

7. A modular refrigeration system comprising:

a plurality of refrigeration system modules, each of said modules comprising: an enclosure having a refrigeration system disposed therein, said refrigeration system including a vapor compression circuit for circulating a refrigerant and having a compressor, a first heat exchanger, an expansion device and a second heat exchanger operably disposed therein in serial order;

said first heat exchanger defining a first outward facing surface of said enclosure, said first surface being a thermal exchange surface wherein said first heat exchanger provides thermal communication between said first surface and refrigerant flowing within said first heat exchanger; said second heat exchanger defining a second outward facing surface of said enclosure; said second surface being a thermal exchange surface wherein said second heat exchanger provides thermal communication between said second surface and refrigerant flowing within said second heat exchanger, said first and second surfaces being disposed on opposite sides of said enclosure; and

at least one attachment feature disposed on said module wherein said at least one attachment feature is attachable to another one of said modules to thereby secure the first surface of one of said plurality of modules in thermal communication with the second surface of another one of said plurality of modules.

8. The modular refrigeration system of claim 7 wherein for each of said modules said at least one attachment feature comprises a plurality of apertures disposed adjacent each of said first and second surfaces.

9. The modular refrigeration system of claim 7 wherein for each of said modules said compressor is a hermetically sealed compressor mounted within said enclosure and said enclosure provides communication between an interior of the enclosure and the ambient environment.

10. A refrigeration system module, comprising:

a frame;

a heating plate having a fluid inlet and a fluid outlet and a first heat transfer surface;

a cooling plate having a fluid inlet and a fluid outlet and a second heat transfer surface;

an expansion device disposed between said heating and cooling plates and in fluid communication with said heating plate fluid outlet and said cooling plate fluid inlet; and

a hermetic compressor assembly comprising a housing, an electric motor and a compression mechanism, said compression mechanism being driven by said motor, said compressor assembly disposed between said heating and cooling plates and having a discharge outlet in fluid communication with said heating plate fluid inlet, and a suction inlet in fluid communication with said cooling plate fluid outlet;

wherein said heating plate, said cooling plate, said expansion device and said compressor assembly are fixed to said frame, and said first and second heat transfer surfaces each at least partially define an exterior surface of said module.

11. In combination with the module of claim 10, wherein said module is a first module, a second said module connected to said first module, said first heat transfer surface of one of said first and second modules being in conductive communication with said second heat transfer surface of the other of said first and second modules.

12. The combination of claim 11, wherein said first heat transfer surface of one of said first and second modules and said second heat transfer surface of the other of said first and second modules are non-planar mating surfaces.

13. The module of claim 10, further comprising a refrigerant receiver interconnecting said heating plate fluid outlet and said expansion device.

14. In combination with the module of claim 10, a cold plate having a third heat transfer surface in conductive communication with one of said first heat transfer surface and said second heat transfer surface, said cold plate having a fluid inlet and a fluid outlet.

15. In combination with the module of claim 10, a conductive heat exchange plate having a third heat transfer surface in conductive communication with one of said first heat transfer surface and said second heat transfer surface, said conductive heat exchange plate having a plurality of fins.

16. The combination of claim 15, wherein said third heat transfer surface and said one of said first heat transfer surface and said second heat transfer surface are of matching areas.

17. A modular refrigeration system, comprising a plurality of refrigeration system modules, each said module including:

a heating plate having a fluid inlet and a fluid outlet and a first heat transfer surface;

a cooling plate having a fluid inlet and a fluid outlet and a second heat transfer surface, said first and second heat transfer surfaces each at least partially defining an exterior surface of said module;

an expansion device disposed between said heating and cooling plates and in fluid communication with said heating plate fluid outlet and said cooling plate fluid inlet; and

a compressor assembly disposed between said heating and cooling plates and having a discharge outlet in fluid communication with said heating plate fluid inlet, and a suction inlet in fluid communication with said cooling plate fluid outlet;

wherein said plurality of refrigeration system modules are configured to be connected to each other in series.

18. The system of claim 17, wherein said first heat transfer surfaces are configured to be in conductive communication with said second heat transfer surfaces of other said modules when said modules are connected to each other in series.

19. The system of claim 18, wherein said first heat transfer surfaces and said second heat transfer surfaces are non-planar surfaces wherein peaks of one surface are received in valleys of the other surface.

20. The system of claim 17, wherein said plurality of refrigeration system modules are configured to be bolted together.

21. The system of claim 17, wherein each said module further includes a frame, and wherein said heating plate, said cooling plate, said expansion device and said compressor assembly are fixed to said frame.

22. The system of claim 17, wherein each said compressor assembly includes a housing, an electric motor, and a compression mechanism, said compression mechanism being driven by said motor.

23. The system of claim 17, wherein each said compressor assembly is hermetic.

24. A refrigeration system module, comprising:
a heating plate having a fluid inlet and a fluid outlet and a first heat transfer surface;
a cooling plate having a fluid inlet and a fluid outlet and a second heat transfer surface;
an expansion device disposed between said heating and cooling plates and in fluid communication with said heating plate fluid outlet and said cooling plate fluid inlet; and
a compressor assembly disposed between said heating and cooling plates and having a discharge outlet in fluid communication with said heating plate fluid inlet, and a suction inlet in fluid communication with said cooling plate fluid outlet;
wherein said first and second heat transfer surfaces each at least partially define an exterior surface of said module.

25. In combination with the module of claim 24, wherein said module is a first module, a second said module connected to said first module, said first heat transfer surface of one of said first and second modules being in conductive communication with said second heat transfer surface of the other of said first and second modules.

26. The combination of claim 25, wherein said first heat transfer surface of one of said first and second modules and said second heat transfer surface of the other of said first and second modules are sawtoothed.

27. The combination of claim 25, wherein said first heat transfer surface of one of said first and second modules and said second heat transfer surface of the other of said first and second modules are of matching areas.

28. The system of claim 24, wherein said module further includes a frame, and wherein said heating plate, said cooling plate, said expansion device and said compressor assembly are fixed to said frame.

29. The system of claim 24, wherein said compressor assembly includes a housing, an electric motor, and a compression mechanism, said compression mechanism being driven by said motor.

30. The system of claim 24, wherein said compressor assembly is hermetic.

31. A refrigeration system module for use in selectively heating or cooling an entity, said module comprising:

a heating plate having a fluid inlet and a fluid outlet and a first heat transfer surface;

a cooling plate having a fluid inlet and a fluid outlet and a second heat transfer surface;

an expansion device disposed between said heating and cooling plates and in fluid communication with said heating plate fluid outlet and said cooling plate fluid inlet; and

a compressor assembly disposed between said heating and cooling plates and having a discharge outlet in fluid communication with said heating plate fluid inlet, and a suction inlet in fluid communication with said cooling plate fluid outlet;

wherein said first heat transfer surface and said second heat transfer surface are selectively arrangable in conductive communication with the entity, depending upon whether the entity is to be heated or cooled by said module.

32. The module of claim 31, wherein the module is configured to be attached to the entity.

33. In combination with the module of claim 32, a support structure configured to support the module when the module is attached to the entity.

34. The module of claim 31, wherein said heating plate and said cooling plate are on opposite sides of the module.